Huygens Mission Overview

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The Cassini-Huygens mission to explore in detail Saturn's system was launched in October 1997, with the Huygens Probe riding on the back of the Orbiter. After a 7-year interplanetary trajectory, the spacecraft was inserted in orbit around Saturn on 1st July 2004. The Huygens Probe was successfully released on 25 December 2004 for its encounter with Titan 3 weeks later on 14 January 2005. After a descent of about 2½ hour under parachute, Huygens safely landed and continued to function flawlessly on the surface for slightly more than 3 hours. Data were received by the Cassini Orbiter for the whole descent and another 72 minutes from the surface. Earth-based radio telescopes received the Huygens carrier for the whole descent and another 3h14min from the surface. During entry, accelerometer measurements enabled the determination of the atmospheric structure profile from an altitude of about 1500 km above the surface down to 160 km altitude. After parachute deployment at 155 km altitude, all instruments were making their measurements. *In situ* measurements were made of the physical properties of the atmosphere, its composition and meteorology. Atmospheric haze was observed during the whole descent all the way down to the surface. Clear images of the surface were acquired below 50 km. They revealed a frozen earth-like world where organic chemistry is trapped in a pre-biotic stage. In this world, methane takes the role of water on Earth. Huygens descended over the boundary between a bright icy terrain, laced with narrow channels and rivers and a darker terrain covered with cm-size ice-pebbles in a dry river or lake-bed covered with a layer of organic matter. Zonal winds blew the probe eastwards by more than 250 km during its descent under parachute. Optical and radar observations of the Huygens landing site area allowed placing the Huygens surface mosaics in their wider context. The coordinates of the Huygens landing site, which are still being refined at the time of writing, are about 10.3S and 192.7W. The Huygens mission was unique in many respects. After giving an overview of the mission the main scientific results will be highlighted. A lessons-learned exercise is being conducted among all components of the Huygens team in order to fully exploit all the results of the mission including management, engineering, operational and scientific return aspects. A brief review of the status of this activity will also be provided. Huygens is the ESA-provided element of the Cassini-Huygens mission, which is a joint NASA-ESA programme in cooperation with the Italian Space Agency.